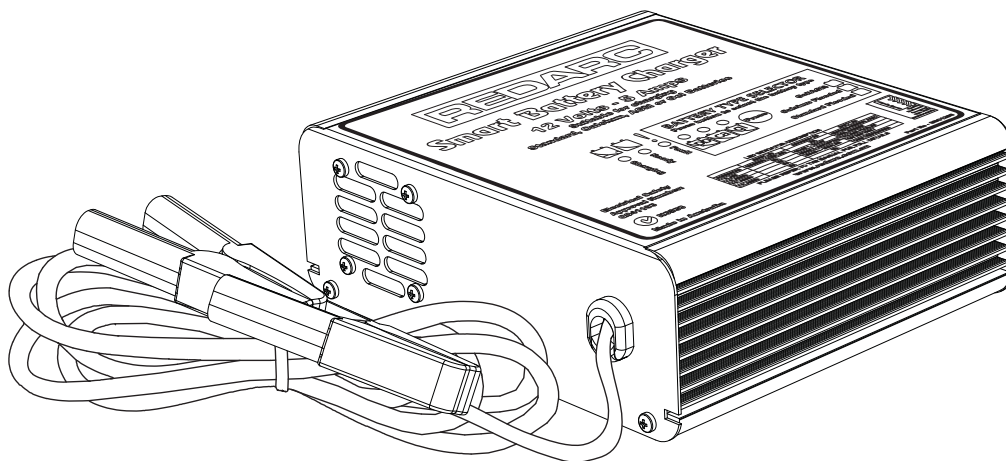




Multi-stage Smart Battery Chargers

SBC1205, SBC24025



THE SMART BATTERY CHARGER

The SBC1205 & SBC24025 are “set and forget” four stage chargers that automatically bring and maintain 100% charge to Lead Acid and Calcium content batteries. Being Smart Battery Chargers, they are controlled by a microprocessor, which is constantly checking the charging process. A battery will last longer and charge faster when charged using the Four Stage process.

WARNING & SAFETY INSTRUCTIONS

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they are supervised or have been instructed on how to use the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

Do NOT disassemble the SBC - the internal circuitry contains hazardous voltages. Attempting to service the unit yourself may result in electric shock or fire and will void the unit warranty.

The SBC should only be powered from an earthed mains socket outlet.

The SBC is not intended for permanent mounting into a vehicle.

Do NOT use the SBC to charge non-rechargeable batteries. Doing so may result in harm to the user and/or damage to the SBC. Only use the SBC for charging Standard Lead Acid, Calcium content, Gel & AGM type, 6 cell, 12V batteries.

All lead acid batteries produce harmful, explosive gases. The Battery should be mounted in a well ventilated area, as far as possible from any ignition sources. Do NOT smoke when in the vicinity of the battery under charge.

Battery acid is a harmful substance. Care should be taken when working with lead acid batteries, if the acid comes into contact with your eyes or skin, immediately wash the affected area with cold running water and seek medical assistance. Eye protection and gloves should be worn when handling lead acid batteries.

The SBC will achieve best results when proper battery maintenance is regularly performed. This includes but is not limited to checking water and specific gravity levels of the battery.

Warning! Check the manufacturers data for your battery and ensure that the ‘Absorption’ voltage of the profile you select does not exceed the manufacturers recommended maximum charging voltage. If the ‘Absorption’ voltage for your battery type is too high, please select another charging profile.

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Specifications

	SBC1205	SBC24025
AC Input Voltage Range	216-265V AC, 50Hz	216-265V AC, 50Hz
Input Fusing	2A Slow Blow	2A Slow Blow
Output Fusing	10A	5A
Nominal Output Voltage	12V	24V
Output Voltage Range	12-16.5V	24-33V
Output Current Range	0-5A	0-2.5A
Output Power	80W	80W
Weight	1.55kg	1.55kg
Dimensions	165x140x60mm	165x140x60mm
Operating Temperature	-5°C to +50°C	-5°C to +50°C
Warranty	2 years	2 years
Standards	C-Tick, AS/NZS CISPR14-1:2003, AS/NZS 3108	

KEY FEATURES

- Charges Standard, Calcium, AGM or Gel Lead Acid batteries (User Selectable via push button switch)
- Reverse polarity connection protection, charging commences after the battery has been connected correctly
- Output short circuit protection
- Battery overcharge protection
- Faulty battery cell detection and safe charge termination
- 4-Stage Charging Pattern with timeout protection
- Initial self test on power up
- Over temperature shut down
- Latest switch mode design
- Designed and manufactured in Australia for Australian conditions
- Safety and EMC compliance
- Light and ultra compact
- Recharges batteries to 100% capacity

1 INSTALLATION

The charger must be placed in a well ventilated position to allow air flow to cool the charger for greater charging efficiency. The charger is best placed on top of the air filter if charging the battery in the vehicle. If that is not possible then find a convenient safe place where the charger is secure and not likely to fall down.

NOTE: Never place the charger on top of the battery.

Leave the vent caps closed as modern automotive batteries have a gas recombination design built into the cap to allow the retention of the gassed electrolyte and its return to the battery cell. All vent caps also have a venting system to allow excessive gasses to escape. Coin screwed cap designs also have a “manifold” venting system, which works in the same way as a screwed vent cap.

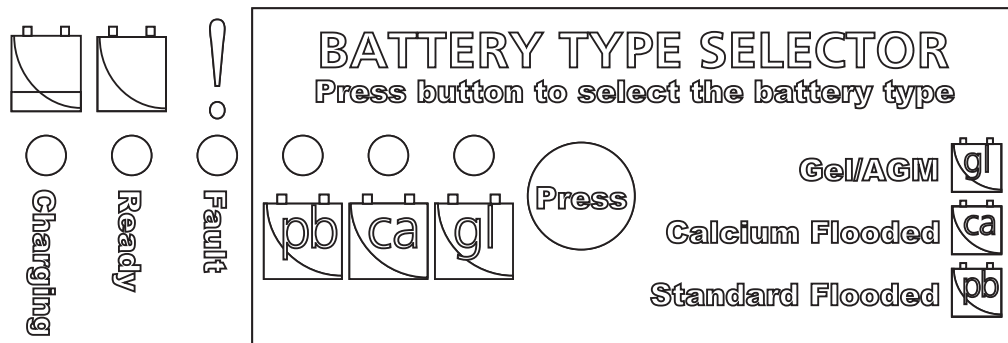
1.1 Connections

Ensure the connections are tight and sound. Then connect the 240VAC three pin plug to the power point and switch on the power. Then switch on the Smart Battery Charger power switch (located on the rear panel).

Once turned ON, the charger will pause momentarily, then light up all the indicators in a sequence so you can see that they are all functional. The cooling fan will also be run up and tested during this sequence.

2 OPERATION

2.1 The Display Panel



The Display Panel features 3 Charging Status LEDs, 3 Battery type indication LEDs and 1 Selector Button as outlined above.

- | | |
|-----------------------------|------------|
| • Charging | ORANGE LED |
| • Ready | GREEN LED |
| • Fault | RED LED |
| • Standard Lead Acid | YELLOW LED |
| • Calcium content Lead Acid | BLUE LED |
| • Gel/AGM (Default) | GREEN LED |

2.2 Selecting Battery Type

You will have 60 seconds from the moment the charger is turned on to make the selection. During the selection period, the selected battery type LED will flash. Once 60 seconds has expired, the selection is locked in for the remainder of the charging period and the selected battery type LED will remain permanently illuminated. Should an incorrect battery be selected, the battery charger should be turned off for approximately 10 seconds, then turned back on. The correct battery selection can now be made.

2.3 The Charging Process

The SBC has been designed to return a discharged battery to 100% charge through a rigorous charging cycle. This charging cycle assumes that no load is connected to the battery during charging, otherwise full charge may not be achieved. It is also possible that the charger may determine that the charging characteristics with a load applied

appears like a fault and terminate the charging cycle. Small loads such as the loads drawn by vehicle electronics with the ignition turned off do not present a problem to normal operation. The charging cycle consists of a number of stages as described over the page, and when completed remains in a float mode indefinitely. It is safe to leave the battery connected to the charger as the float mode will not allow over charging whilst maintaining the battery to a fully charged state.

If the battery remains connected to the charger and a charge cycle completes, the charging cycle will not restart even if the battery becomes discharged by a load. Instead, the charger will continue in float mode. The full charge cycle can only be restarted by turning the charger off, waiting for approximately 10 seconds, then turning it back on again.

4 - Stage Charging Process

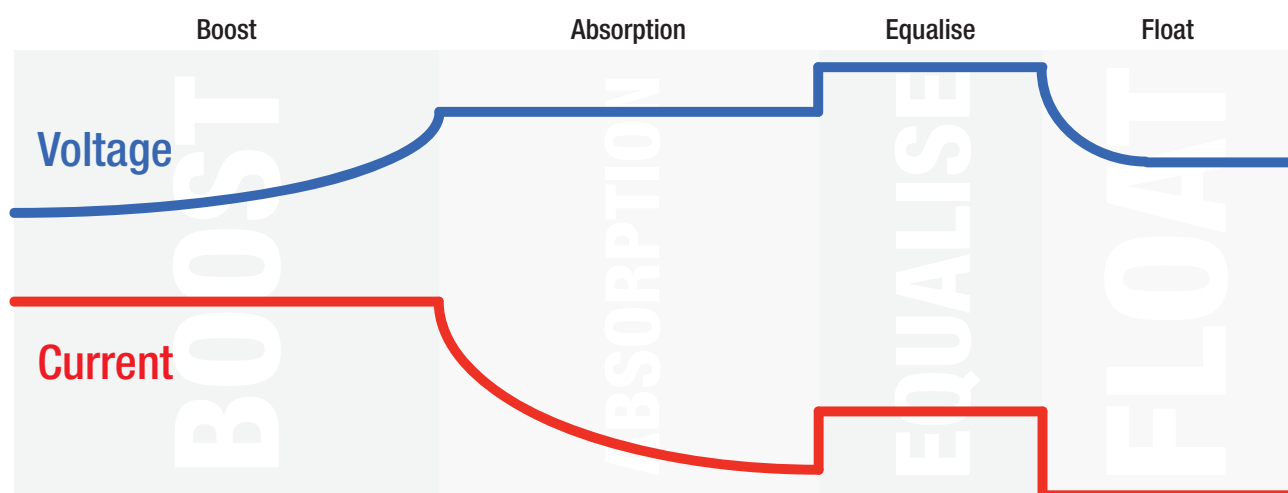


Figure 1.4.1 - 4-Stage Charging Process

2.4 Indication

- The Charging indicator (ORANGE) will indicate one of the first 3 charging stages via a number of quick flashes, followed by an OFF period.
- When the Ready indicator (GREEN) is ON, the battery has finished charging and is now in Float mode..
- If the Fault indicator (RED) is flashing, a fault has caused the charging process to terminate. The number of quick flashes, followed by a longer OFF period indicates the nature of the fault. The fault indication will be reset when the charger is switched OFF.

2.4.1 Charging indicator (Orange)

This indicator is used during the first three stages of charging (Boost, Absorption and Equalise), and flashes at different rates to indicate the charging mode.

Boost Mode: Orange indicator ON-single flash. This mode delivers the bulk charge to the battery by delivering maximum constant current. This stage is time limited to cater for a fully discharged 40Ah battery, however the time taken in this mode does greatly depend on the condition and state of charge of the battery.

Absorption Mode: Orange indicator ON-double flash.

This mode must be finished before Equalise can take place. The charger maintains constant charging voltage, while the current reduces. This voltage is close to the gassing voltage of the electrolyte.

Equalise Mode: Orange indicator ON – triple flash.

This mode brings the battery to full charge. A higher voltage is applied to induce some gassing, which mixes the electrolyte, bringing the cells to equal potential. In a low maintenance battery, most of the hydrogen and oxygen gasses will recombine and will not dry out the battery.

Note that this mode is not run for Gel/AGM batteries.

2.4.2 Ready indicator (Green)

Continuously ON: Indicates that the battery charging process is complete, and full charge (100%) has been achieved. The charger is now in the maintenance mode (Float), where it will keep the battery at full charge indefinitely without the fear of overcharging. The battery is ready for use, and can be disconnected.

Flashing: Indicates that the battery charging process is complete, and full charge (100%) has been achieved. The charger is now in the maintenance mode (Float), where it will keep the battery at full charge indefinitely without the fear of overcharging. The battery is ready for use, and can be disconnected.

2.4.3 Fault indicator (Red)

When faults are detected, the charger shuts down the charging process and displays the nature of the fault via a Red flashing LED. Possible faults are;

Continuously on - Hardware failure detected:

The SBC1205 failed its self-test on power up. The unit should be returned to the supplier for inspection.

One Flash - Over current detected:

An excessive current will cause this fault. This will indicate a faulty battery if it occurs during a charging cycle, but not necessarily if it happens upon connection. This fault may also be triggered by trying to charge a lower voltage battery than specified e.g. 6V on a 12V charger.

Two Flashes - Voltage problem detected:

A battery that remains at a low voltage for too long or a battery which has a higher voltage than specified, will cause this fault e.g. attempting to charge a 24V battery on a 12V charger.

Three Flashes - Faulty battery detected:

Charging a battery with a dead cell will result in this fault. With some batteries it might take longer to detect the fault than in others, depending upon the initial level of charge and also how damaged the battery is. If the battery is badly damaged, the fault may show up as over current.

Four Flashes - Overheat:

The charger is too hot to operate, the charging process is suspended, and will recommence once the charger has cooled down. This can happen on a very hot day, if the charger is positioned in a very hot place while charging or if the ventilation holes have been blocked. Also, the fan may not be functioning properly.

If the battery charger detects a fault it will shut down immediately. In this case, check if connections to the battery are tight. Is the battery sound? Check the electrolyte levels and use a Hydrometer to check for “dead” cells. A lead-acid battery is considered to be discharged when the specific gravity of the electrolyte is less than 1.16.

- Ensure the correct battery type has been selected before charging begins.
- Before connecting or disconnecting the SBC to a battery, ensure that it is disconnected from the 240VAC supply.
- NOTE disconnecting the battery from the vehicle will cause some components in the vehicle to lose stored memory or information, such as time on your stereo.
- Ensure electrolyte levels in the battery to be charged are sufficient to cover the plates (if accessible).
- DO NOT use the charger to charge a battery near a naked flame. The gasses emitted by the battery whilst charging may ignite, causing a life threatening fire or explosion.
- Always wear eye protection if working close to a charging battery.
- Take care whilst handling a lead acid battery, as the electrolyte is acidic and may cause permanent damage to skin or clothing.
- The charger is designed to be used indoors and to be protected from the elements. Do not expose the battery charger to the weather, particularly rain or dampness.
- Provide adequate ventilation whilst charging lead-acid batteries. This will ensure the charger will work at maximum efficiency and that any gasses emitted from the battery are safely dissipated.
- Do not extend the output cables supplied between the charger and the battery to be charged, otherwise efficiency of operation will be compromised. Ensure the output clamps are firmly attached to the battery poles.
- Incorrectly connecting the Positive (+ Red wire) and Negative (- Black wire) at the battery will switch off the battery charger to protect it's internal electronics. Output and consequent charging will only recommence when the (+) and (-) are correctly attached to the corresponding (+) and (-) poles on the battery.
- Do not obstruct the fan. Note that the fan will run continuously during the charging cycle.
- If the power cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid hazard.
- The charger is designed to charge batteries constructed with 6 cells only.
- For in-vehicle charging,
 1. The battery charger must be connected first to the battery terminal which is not connected to the vehicle chassis. The other connection is to be made to the chassis, remote from the battery and fuel line. The battery charger is then to be connected to the supply mains.
 2. After charging, disconnect the battery charger from supply mains. Then remove the chassis connection and the battery connection, in this order.

4.1 Charging Time & Battery Capacity

The charging time is dependant on a number of conditions including the ambient temperature and the general condition or age of the battery. However it is primarily dependant on how many Amp-Hours need to be put back into the battery to restore full charge, rather than the battery capacity itself. For example, a 50% discharged 45Ah battery requires 22.5Ah to be restored, while a 50% discharged 70Ah battery requires 35Ah to be restored. (Note: Due to inefficiencies in the battery, approximately 10% more is required to be delivered by the charger in practice). Based on the wide variety of conditions, the charger can be expected to restore approximately between 1 and 3 Amp-Hours per hour of charge.

To determine if a charger is too big for your battery, use the rule of thumb that the maximum battery charge current should be typically between 10% and 20% of the battery Amp-Hour rating. i.e. for a 50Ah battery, the typical maximum charging current should be less than 20% of 50Ah = 10A.

As a safety precaution, the maximum charge time has been limited to 25 hours. Please refer to “Ready indicator (Green) Flashing” in section 3.1 for a description of what happens if the charge cycle does time out.

4.2 Calcium Batteries

In the Calcium battery selection mode the charger can achieve a maximum voltage of 16.5V (33V for 24V unit), the following precautions should be taken:

- Vehicle ignition must be OFF
- Vehicle lights must be OFF
- Accessories must be OFF. This includes mobile telephones, radios and sound systems, DVD players and any other non ignition activated accessories installed.
- Be sure any caravans or boats connected to the vehicle, where the battery is being charged also have all their electrical systems turned off. A good precaution is to disconnect the trailer / caravan plug from the towed vehicle.

Most new vehicles can tolerate this voltage without damage to the vehicle electrical system. To ensure that your electrical system will tolerate this maximum charging voltage, please contact your vehicle service centre.

5 TWO YEAR PRODUCT WARRANTY

Over the last three decades our company has established a reputation as the power conversion specialist.

A 100% Australian-owned company, we have met the needs of customers in transport and other industries through exciting, innovative thinking.

We believe in total customer satisfaction and practice this by offering our customers:

- Technical advice free of jargon and free of charge
- Prompt turnaround of orders throughout Australia and globally
- Friendly, personalised, professional service and product support

In the unlikely event that a technical issue arises with a Redarc product, customers are encouraged to initially contact the Redarc Technical Support Team on (08) 8322 4848 or power@redarc.com.au for prompt and efficient diagnosis and product support.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

The benefits of this Warranty are in addition to other rights and remedies available at law in respect of the Products and shall not derogate from any applicable mandatory statutory provisions or rights under the Australian Consumer Law.

Redarc Electronics Pty Ltd at the Redarc Trust trading as Redarc Electronics ("**Redarc**") offers a warranty in respect of its Products where the Products are purchased from an authorised distributor or reseller of Redarc by a person ("**Purchaser**"), on the terms and conditions, and for the duration, outlined below in this document ("**Warranty**").

1. In this Warranty, the term **Products** means:
 - 1.1 all products manufactured or supplied by Redarc (excluding its solar products which are covered by Redarc's Solar Product Warranty); and
 - 1.2 any component of or accessory for any product in clause 1.1 manufactured or supplied by Redarc.

Offer and duration of product warranties

2. Redarc warrants that its Products will be free, under normal application, installation, use and service conditions, from defects in materials and workmanship affecting normal use, for **2 years** from the date of purchase (**Warranty Period**).
3. Where a Product malfunctions or becomes inoperative during the Warranty Period, due to a defect in materials or workmanship, as determined by Redarc, then subject to further rights conferred by the Australian Consumer Law on the Purchaser, Redarc will, in exercise of its sole discretion, either:
 - 3.1 repair the defective Product;
 - 3.2 replace the defective Product; or
 - 3.3 provide a refund to the Purchaser for the purchase price paid for the defective Product,without charge to the Purchaser.
4. The warranty given by Redarc in clause 3 covers the reasonable costs of delivery and installation of any repaired or replaced Products or components of Products to the Purchaser's usual residential address notified to Redarc, together with the reasonable costs of removal and return of any Products determined by Redarc to be defective.
5. If the Purchaser incurs expenses of the nature referred to in clause 4 in the context of making a claim pursuant to this Warranty that is accepted by Redarc, the Purchaser will be entitled to claim for reimbursement of those expenses which Redarc determines, in exercise of its sole discretion, to be reasonably incurred, provided that the claim is notified to Redarc in writing at the postal address or email address specified in clause 21 and includes:
 - 5.1 details of the relevant expenses incurred by the Purchaser; and
 - 5.2 proof of the relevant expenses having been incurred by the Purchaser.

Exclusions and limitations

6. This Warranty will not apply to, or include any defect, damage, fault, failure or malfunction of a Product, which Redarc determines, in exercise of its sole discretion, to be due to:
 - 6.1 normal wear and tear or exposure to weather conditions over time;
 - 6.2 accident, misuse, abuse, negligence, vandalism, alteration or modification;
 - 6.3 non-observance of any of the instructions supplied by Redarc, including instructions concerning installation, configuring, connecting, commissioning, use or application of the Product, including without limitation choice of location;
 - 6.4 failure to ensure proper maintenance of the Product strictly in accordance with Redarc's instructions or failure to ensure proper maintenance of any associated equipment or machinery;
 - 6.5 repairs to the Product that are not strictly in accordance with Redarc's instructions;
 - 6.6 installation, repairs or maintenance of the Product by, or under the supervision of, a person who is not a qualified auto electrician or technician, or if non-genuine or non-approved parts have been fitted;
 - 6.7 faulty power supply, power failure, electrical spikes or surges, lightning, flood, storm, hail, extreme heat, fire or other occurrence outside the control of Redarc;
 - 6.8 use other than for any reasonable purpose for which the Product was manufactured;
 - 6.9 any indirect or incidental damage of whatever nature outside the control of Redarc.
7. Warranty claims in respect of a Product must be made in writing to Redarc at the postal address or email address specified in clause 21 within the Warranty Period. Such claims must include the following:
 - 7.1 details of the alleged defect or fault and the circumstances surrounding the defect or fault;
 - 7.2 evidence of the claim, including photographs of the Product (where the subject of the claim is capable of being photographed);
 - 7.3 the serial number of the Product, specified on the label affixed to the Product; and
 - 7.4 proof of purchase documentation for the Product from an authorised distributor or reseller of Redarc, which clearly shows the date and place of purchase.The return of any Products without the prior written instructions of Redarc will not be accepted by Redarc.

8. Without limiting any other clause in this Warranty, Redarc has the right to reject any Warranty claim made by a Purchaser pursuant to this Warranty where:
 - 8.1 the Purchaser does not notify Redarc in writing of a Warranty claim within the Warranty Period;
 - 8.2 the Purchaser does not notify Redarc in writing of a Warranty claim within 1 month of becoming aware of the relevant circumstances giving rise to the claim, so that any further problems with the Product are minimised;
 - 8.3 the serial number of the Product has been altered, removed or made illegible without the written authority of Redarc;
 - 8.4 the Purchaser is unable to provide proof of purchase documentation in accordance with clause 7.4 or evidence that the Product was properly installed and removed (if relevant), and that proper maintenance has been performed on the Product, by, or under the supervision of, a qualified auto electrician or technician, in accordance with the instructions of Redarc.
9. If the Product is found to be working satisfactorily on return to Redarc or upon investigation by Redarc, the Purchaser must pay Redarc's reasonable costs of testing and investigating the Product in addition to shipping and transportation charges. Where Redarc is in possession of the Product, the Product will be returned to the Purchaser on receipt of the amount charged.
10. Any replaced Products or components of Products shall become the property of Redarc.
11. Redarc may, in exercise of its sole discretion, deliver another type of Product or component of a Product (different in size, colour, shape, weight, brand and/or other specifications) in fulfilling its obligations under this Warranty, in the event that Redarc has discontinued manufacturing or supplying the relevant Product or component at the time of the Warranty claim, or where such Product or component is superior to that originally purchased by the Purchaser.

Other conditions of Warranty

12. If the Purchaser acquired a Product for the purpose of resupply, then this Warranty shall not apply to that Product.
13. In particular, the sale of a Product via an online auction, online store or other internet website by a party that is not an authorised distributor or reseller of the Product will be deemed to be a resupply within the meaning of the Australian Consumer Law and will render this Warranty void, as Redarc has no control over the storage, handling, quality or safety of Products sold by such persons.
14. A Purchaser shall only be entitled to the benefit of this Warranty after all amounts owing in respect of the Product have been paid.
15. While Redarc warrants that the Products will be free from defects in materials and workmanship in the circumstances set out in this Warranty, to the maximum extent permitted by law Redarc does not warrant that the operation of the Products will be uninterrupted or error-free.
16. To the maximum extent permitted by law, Redarc's determination of the existence of any defect and the cause of any defect will be conclusive.
17. Spare parts or materials for the Products are guaranteed to be available for a period of at least 2 years after purchase of the Products.
18. The agents, officers and employees of any distributor or reseller of the Products and of Redarc are not authorised to vary or extend the terms of this Warranty.
19. Redarc shall not be responsible or liable to the Customer or any third party in connection with any non-performance or delay in performance of any terms and conditions of this Warranty, due to acts of God, war, riots, strikes, warlike conditions, plague or other epidemic, fire, flood, blizzard, hurricane, changes of public policies, terrorism and other events which are beyond the control of Redarc. In such circumstances, Redarc may suspend performance of this Warranty without liability for the period of the delay reasonably attributable to such causes.
20. If a clause or part of a clause in this Warranty can be read in a way that makes it illegal, unenforceable or invalid, but can also be read in a way that makes it legal, enforceable and valid, it must be read in the latter way. If any clause or part of a clause in this Warranty is illegal, unenforceable or invalid, that clause or part is to be treated as removed from this Warranty, but the rest of this Warranty is not affected.

Redarc's contact details

21. Redarc's contact details for the sending of Warranty claims under this Warranty are:

Redarc Electronics Pty Ltd
23 Brodie Road (North), Lonsdale SA 5160
Email: power@redarc.com.au
Telephone: +61 8 8322 4848



Free technical assistance!

please contact

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